

# **Mountaintop Mining/Valley Fill Environmental Impact Statement Technical Study**

## **Work Plan for Terrestrial Habitats**

November 1999

### **I. Problem Statement**

Mountaintop removal/valley fill (MTR/VF) mining operations in the Appalachian coal fields involves fundamental changes to the region's landscape and terrestrial wildlife habitats. With the increasing size of these operations, a single permit may involve the conversion of hundreds or even several thousand acres of land dominated by hardwood forests into open space. While the original forested habitat was crossed by flowing streams and was comprised of steep slopes with microhabitats determined by slope, aspect, and moisture regimes, the reclaimed mines are often devoid of flowing water, and are most commonly dominated by erosion-controlling, herbaceous communities. Islands of remnant hardwood vegetation may also be present on some of the reclaimed mines, and some planting of trees and shrubs has also been undertaken. The long-term and cumulative impacts of these changes on wildlife and their habitats has not been thoroughly studied at the Federal level.

### **II. Goals and Questions to be Addressed by this Work Plan**

The steering committee for the Environmental Impact Statement (EIS) has adopted goals and questions to be addressed from several different perspectives: environmental, regulatory, and public service. This work plan, in conjunction with the other work plans and technical symposia that will be conducted during the preparation of the EIS, will attempt to address the following goals as adopted by the committee:

- To determine the impact on environmental resources (including wildlife) from the size and location of excess spoil disposal in valley fills associated with mountaintop mining operations,
- To show . . . how such mining operations might be carried out in a way that minimizes adverse impacts to environmental resources, and
- To examine how to improve environmental assessment and design of individual mining projects.

Similarly, this work plan will attempt to answer the following questions posed by the EIS steering committee:

- How will we measure the effects (impacts of mountaintop mining operations and associated valley fills on wildlife and their habitats?

- What are the most appropriate qualitative and quantitative measures of effectiveness of forest/habitat impact and restoration?
- What are the short-and long-term effects of individual mountaintop mining operations and associated valley fills on terrestrial habitats and wildlife populations (with emphasis on migratory birds, mammals, and herptiles) within and adjacent to the mined and filled areas?
- What are the expected effects likely to be on terrestrial species of federal and state concern (i.e., listed and proposed threatened and endangered species, candidate species and species of special concern)?
- What are the relative individual and cumulative effects of a single large valley fill versus multiple small headwater fills?
- How do we evaluate and improve forest reclamation practices so that forest fragmentation and habitat disruption are considered? If there are competing uses for mined land, what are the key indicators from an environmental standpoint for determining which areas can be developed (e.g., farming, sport hunting habitat, commercial forestry, development) and which areas should be returned to their pre-mining state (e.g., characteristic mixed hardwood forest)?
- How effective have the reclamation practices and compensatory mitigation measures required to date for mountaintop removal and other mountaintop mining operations, and for valley filling, been in offsetting the adverse effects of such activities on terrestrial environments? What have been the frequency, results and effectiveness of follow-up compliance monitoring?
- What environmental analyses should be required before a mining plan is submitted? During mining? After mining and reclamation end?
- Regarding the success of current reclamation plans for mountaintop mines and valley fills in replacing premining terrestrial habitats, can designs be modified to further enhance or accomplish this?
- Regarding the effectiveness of existing forms of mitigation associated with valley fills in replacing or providing substitute resources, can existing forms of mitigation be modified to further enhance or accomplish this?

### **III. EIS Team Members and Experts Consulted**

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Experts Consulted: Drs. Petra Bohall Wood, John Edwards, John Sencindiver, and Jeff Skousen, West Virginia University; Dr. Margaret Brittingham, the Pennsylvania State University; Dr. Ron Canterbury, Concord College; Dr. Steven Handel, Rutgers University.

#### **IV. Study Approach**

The terrestrial study has been subdivided into four smaller studies:

- 1. Revegetation and succession**
  - a. Ability of plants to naturally invade large mine sites**
  - b. Effects of large, open mine sites on surrounding habitats**
  - c. Succession of habitats on older (10-20 years old) mine sites**

**Project Director:** Dr. Steven Handel, Center for Restoration Ecology, Rutgers Univ.

This study would involve the use of vegetation surveys along transect lines across mine sites and into adjacent unmined forests. Forest vegetation surveys in unmined watersheds would also be conducted. Succession would be examined with random vegetation survey points scattered across revegetated portions of reclaimed mine sites. Tasks include data collection, data analyses, literature review, and preparation of final report.

#### **2. Soil health and organisms at mine sites vs. reference sites**

**Project Director:** Dr. John Sencindiver and Dr. Jeff Skousen, West Virginia University

Field work is needed to investigate soil conditions on existing reclaimed mine sites. Tasks include data collection, data analyses, literature review, and preparation of final report.

Soil quality or health can be broadly defined as the capacity of a living soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and promote plant and animal health. Minesoil health is important, not only for initial revegetation, but also for continued long-term productivity and environmental quality. Since minesoils are drastically disturbed soils, their initial properties will be different than the surrounding undisturbed soils. However, minesoil development over time is subject to the same soil forming factors and processes that have developed the contiguous undisturbed soils and will eventually result in properties similar to those soils. Therefore, studies of minesoil health must include some documentation of soil development over time. The objective of this study is to evaluate soil development and health on mountaintop removal coal mines in southern West Virginia.

Two different ages of minesoils will be selected for sampling. These minesoils will have similar geology and topography, and they will have been mined and reclaimed by similar methods. One will be the oldest accessible site on each mine, and the other will be the youngest. Three sampling points will be located on each site. In addition, three sampling points will be located on the contiguous undisturbed soils at elevations and aspects similar to the minesoils. Soil pits will

be dug to a depth of 50 cm, if possible, at each sampling point. The soil will be described, and the top two horizons will be sampled for laboratory analyses. The analyses will include texture; bulk density; total carbon, sulfur, and nitrogen; extractable Ca, Mg, K and Na; extractable acidity and aluminum; cation exchange capacity and effective cation exchange capacity; pH; electrical conductivity; and microbiological assays including microbial biomass C and N, potentially mineralizable N, and soil respiration.

### **3. Bird (breeding season), small mammal, and herptile use of mined vs. reference sites, and quantification of habitat structure (vegetation)**

**Project Directors:** Dr. Petra Wood and Dr. John Edwards, West Virginia University

Bird abundance will be quantified with point-counts during the breeding season (end of May through the 3rd week in June) in 4 treatments: reclaimed mines (young and old reclamation), forests surrounded by reclamation, and unmined sites. Nesting success will be quantified during May-August on young reclaimed mine sites. Small mammal surveys will be conducted in all 4 treatments via live-trapping May-August. Herptile surveys during February-September will be conducted using drift fence arrays on mined and unmined sites. Vegetation structure of the study sites and at songbird nests will be measured. Tasks include data collection, data analyses, literature review, and preparation of final report.

### **4. Edge habitats, stop-over ecology, and winter survivorship of birds**

**Project Director:** Dr. Ron Canterbury, Concord College

The following studies will be conducted: (1) bird-habitat associations along edge habitats in the five selected watersheds; (2) age class and stop-over ecology of short-distance and long-distance migrants using bird banding methods; (3) microhabitat preference and winter foraging ecology of permanent resident and winter resident birds; (4) compile, analyze, and report data from 14 years of research on over 80 mine sites throughout southern WV. Tasks include data collection, data analyses, literature review, and preparation of final report.

## **V. Budget Summary**

|              |   |                  |
|--------------|---|------------------|
| 1.           | Ability of plants to naturally invade large mine sites, effects of large, open mine sites on surrounding habitats, succession of habitats on older (10-20 years old) mine sites | \$18,614         |
| 2.           | Soil health and organisms at mine sites vs. reference sites   | 13,130           |
| 3.           | Bird, small mammal, herptile and vegetation structure surveys and associated literature   | 103,064          |
| 4.           | Edge habitats, stop-over ecology, and winter survivorship of birds  | <u>47,672</u>    |
| <b>Total</b> |   | <b>\$182,480</b> |